C3 Cont

55. (NEW) The gas discharge display device of claim 34, further comprising a discharge space filled with a Penning gas composed essentially of neon and xenon as a discharge gas.

REMARKS

INTRODUCTION

In accordance with the foregoing, claims 1-9 and 28 have been amended. Claims 29-55 have been added. Claims 23-27 were withdrawn from consideration. No new matter is being presented, and approval and entry are respectfully requested.

Claims 1-22 and 28-55 are pending and under consideration.

REJECTIONS UNDER 35 USC §112, SECOND PARAGRAPH

In the Office Action, at pages 3-6, claims 1-9 and 28 were rejected under 35 U.S.C. §112, second paragraph, for the reasons set forth therein.

The "front-side" that caused claim 1's §112 rejection has been deleted.

Claims 2 and 9 have been amended to clarify that the first element is not more intense than itself, but rather is more intense than it would be if it were unfiltered ("higher than would be necessary to reproduce the whitish color intended for display by using [the] a light-emission of first through third display elements corresponding to said first to third fluorescent substances [without] that is not received by said filter"). It is noted that parent claim 1 recites the filter receiving color emission. These claims have also been amended to recite "a combined light-emission of first through third display elements", addressing the Examiner's other reason for rejection. Claims 4, 6, 8, and 28 have been similarly amended.

The Examiner objected to "structure" in claim 2 as not being defined in the claims. The Examiner appears to have objected to "structure" due to its breadth, and has not explained what is indefinite about "structure". MPEP § 2173.04 states that "Breadth of a claim is not to be equated with indefiniteness." Although this rejection is traversed, for clarity "structure" has been changed to "dimension", a clearly understood parameter of physical construction. Claims 3, 5, and 7 have been similarly amended.

Withdrawal of the §112 rejection is respectfully requested.

REJECTIONS UNDER 35 USC §103

Claims 1, 3, 5, 7, 11, 14-20, and 28 were rejected as obvious in view of Ueoka (US 6,034,474), Kirschner (US 4,989,953), and Vriens (US 5,813,753). Claim 10 was rejected in further view of Blaisdell (US 4,990,821). Claims 12 and 13 were rejected in further view of Wada (US 4,626,071). Claim 21 was rejected in further view of Asano (US 6,008,582). Claim 22 was rejected in further view of Raber (US 4,803,402).

In general, the present invention involves several features that in combination lead to a plasma display that uses a discharge gas and that is capable of reproducing colors, particularly white, with greater accuracy and range than prior art displays. It is respectfully noted that the color white depends on a proportional balance between component colors, for instance red, blue and green. If red light is filtered then its contribution relative to blue and green decreases, disturbing the balance of contributory colors necessary to produce white light. If bright or dim white light is to be displayed, the red, blue, and green contributions must be proportionally adjusted. However, such adjustment is limited when a component color, such as red, is filtered.

CLAIMS 1, 28, 30, AND 34

Claim 1 recites substances that together are "set to emit ... a color [other] warmer than a whitish color when a color to be displayed using the display device is the whitish color". Claim 1 also recites "a filter [...] to receive the emitted color [other] warmer than the whitish color and [to approximate] adjusting [to the whitish color] the warmer color to [be displayed] the whitish color to be displayed, by attenuating light in an emission wavelength region of the discharge gas". The Examiner alleged that adjusting a color to a desired color with a filter is obvious. However, in claim 1, the filter is used in combination with an increased intensity ("wherein said ... *substances are set to emit*, in combination, a color [other] warmer than a whitish color"). In other words, a part of the light, for example red, is set to be more intense ("warmer") than necessary for white, and is also filtered. Thus, claim 1 involves a mutual increase of intensity (emitting warmer than white light) and decrease of intensity (filter) of the same light, which is not obvious. Without the insight of the present application, one skilled in the art would consider this simultaneous increase and decrease of intensity to be a wash having no apparent benefit. One faced with a pre-existing undesirably high light intensity might lower it with a filter, but one would not set to higher than necessary an already apparently suitable intensity merely to filter it.

Claim 1 also makes use of a novel observation of the present application that plasma displays using a discharge gas can be constructed to filter a component of the displayed light,

which includes light from the discharge gas and light from a fluorescent substance, and at the same time, contrary to what would be expected, improve the display of white light. One reason this is not obvious is that it is already possible to display white light with display substances. There is no reason why one with a display already capable of displaying white light would add to it a filter that would hinder the display of a component of the white light (e.g. red). Furthermore, even if one decided for some reason to filter the white light of a display, they would be faced with the problem that the filter affected the relative contributions of the color components, apparently making it even less desirable to add a filter to a white display.

However, the present invention shows that, contrary to expectation, if one were to take this apparently pointless and counter-productive measure, it is possible to compensate for the filter attenuation by setting a substance's intensity to be higher than necessary for white (e.g. warmer than white light), and thereby reproduce the white color in the presence of the filter. Even at this unobvious stage, one of ordinary skill in the art would only see a display back at its original state of simply displaying white light; the advantage is not obvious. As recited in the claims, properly selecting the filter and increasing the intensity of a cell that is affected by the filter can increase the relative contribution of that cell's color while reducing the influence of the undesirable discharge gas color whose color overlaps the cell's color. Thus, the range of color reproduction and quality of white colors can be improved with an unobvious combination of features.

The Examiner cited Kirschner as stating that it is well known that colors can be produced by combinations of primary colors, and some of those colors can be attenuated with filters. Kirschner might teach filtering to adjust color, but it does not teach setting a light that is warmer than is necessary to display a white color. Ueoka adds only a PDP, and Vriens only adds the fact that multiple colors can be generated with a blue/UV LED by placing different blue/UV-responsive fluorescent phosphors near such an LED. Vriens discusses combining elements to produce a color, but does not teach setting one of them to emit at a higher level than necessary. Vriens merely teaches that if white is required, the elements would be combined to produce white rather than non-white.

By similar reasoning, claims 28, 30, and 34 are also distinguishable. Claim 28 recites "a light-emission intensity of at least one of the fluorescent substances [...] is *set to be larger* than [...] would be necessary to display an intended white light by simultaneous unfiltered light emission of the fluorescent substances, so that light within the wave range is emitted with

intensity to compensate for attenuation of light within the wave range absorbed by the filter". Claim 30 recites "the first cell has an intensity greater than necessary to reproduce, in conjunction with the color emitted by the second and third cells, the target light". Claim 34 recites "a light-emission intensity of at least one of the fluorescent substances is *set to be larger* than would be necessary to display an intended white light by simultaneous light emission of the fluorescent substances, so that light within the wave range is emitted with intensity to compensate for attenuation of light within the wave range absorbed by the filter". Claims 28, 30, and 34 (and others) clearly indicate that the intensity of a substance is set to be higher than necessary, implying that the same substances could be used to produce white without a filter. Thus, absent the present invention, the substances without the filter would be capable of displaying white light, and there would not have been a motive to increase the intensity of one of the substances while decreasing its intensity (or a portion of its intensity) with a filter.

CLAIMS 14 AND 15

Claim 14 recites a filter with a lowest transmissivity range in the range of 560 to 610 nanometers. The Examiner alleged that this range is a routine optimization of a working range. MPEP § 2144.05(B) states that "A particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation." The prior art does not show, and the Examiner has not alleged, that peak transmissivity of the filter is a result-effective variable.

Furthermore, this range closely encompasses the emission peak (590 nm) of the discharge gas (see the transmissivity dip/emission peak in Fig. 7A). This can allow the light emitted by the red fluorescent substance, some of which is outside but near the range, to be utilized (see p. 18, line 18, to p. 19, line 11 of the specification). In other words, the portion of the light from the attenuated fluorescent substance which does not overlap with the emission peak of the discharge gas can be used for display and will be filtered less than the discharge light, thus improving the color expression (see also the new claims). Therefore, it would not have been obvious to choose the 560 to 610 nm waveband because selection of this waveband can be critical for the effect of color reproduction, particularly white color. Withdrawal of the rejection of claims 14 and 15 is respectfully requested.

CLAIM 28

In item 22 of the Office Action, the Examiner rejected claim 28 as obvious over Ueoka,

Kirschner, and Vriens. However the Examiner did not present any discussion of claim 28. Under US PTO guidelines, an Examiner is required to clearly articulate which portions of a reference support a rejection. The Examiner is respectfully requested to provide reasoning and point to prior art portions that support the rejection of claim 28.

The Examiner is also respectfully requested to provide a motive found *in the prior art* to combine the prior art references. At items 28 and 29 of the Office Action, the Examiner referred only to general concepts found in the prior art references (e.g. phosphors and purifying filters), and said that it would be obvious to combine them "for displaying a whitish color". The Examiner is respectfully requested to provide a required motive, found in the references, that would have motivated one to combine the prior art teachings to result in the apparatus of claim 28.

DEPENDENT CLAIMS

The dependent claims are deemed patentable due at least to their dependence from allowable independent claims. These claims are also patentable due to their recitation of independently distinguishing features. For example, claim 2 recites "a structural [condition] dimension of a first display element corresponding to said first fluorescent substance is different from structural [conditions] dimensions of second and third display elements corresponding to said second and third fluorescent substances". Similarly, claims 3 and 5 recite a surface area of an electrode is larger than necessary to produce white light. The Examiner has cited prior art references discussing electrodes, but not with a surface area so configured. These and other structurally/dimensionally varying features can be significant because they can allow the filtered element to compensate for filtration of its desirable light by increasing its desirable emission (from its substance), while at the same time eliminating or reducing the need to increase the intensity of the filtered cell's undesirable discharge gas light. This feature is not taught or suggested by the prior art. Withdrawal of the rejection of the dependent claims is respectfully requested.

NEW CLAIMS

New claims 29-35 have also been added to clarify an aspect of the present invention with respect to selective filtration and compensatory intensity.

New claim 36 recites features reflecting that the present invention can be significantly characterized by its selective absorption of unnecessary light emitted by the discharge gas ("absorbing light within a wave range of visible light emitted by the discharge gas"). To

compensate for the attenuation of necessary light (R, G, or B, e.g.), which is attenuated along with the simultaneous absorption of the unnecessary light, the display is so constructed that the necessary desirable light is emitted with sufficient intensity to compensate for its attenuation ("a light-emission intensity of at least one of the fluorescent substances is set to ... compensate for attenuation of light within the wave range absorbed by the filter"). Thus, it is possible to remove the unnecessary light while maintaining the intended reference white light.

Ueoka uses a filter to allow the electromagnetic field shielding layer to exist on boundaries between adjacent color filters. Kirschner uses a filter to reduce light transmittance for wavelengths close to wavelength of peak light emission of the display device. Vriens uses a filter to convert light to a desired color or to enhance the color purity of colored light emitted from phosphors of the three primary colors. Wada uses a filter to increase the contrast of the picture displayed on a display device. None of these references, alone or in combination, teach selective filtering as recited at least in claim 34.

Allowance of claim new 29-55 is respectfully requested.

CONCLUSION

In accordance with the foregoing, claims 1-9 and 28 have been amended. Claims 29-55 have been added. Claims 1-22 and 28-55 are pending and under consideration.

There being no further outstanding objections or rejections, it is submitted that the application is in condition for allowance. An early action to that effect is courteously solicited.

Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

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CERTIFICATE UNDER 37 CFR 1.8(a)

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on JAN 29, 20 02

STAAS & HALSEY

By: James Strom

Date: 29 JAN 2002

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Please AMEND and ADD to the claims as follows:

1. (TWICE AMENDED) A gas discharge display device for displaying a color image, comprising:

first, second and third fluorescent substances having different emission colors [and a common front side], wherein said first, second, and third fluorescent substances are set to emit, in combination, a color [other] warmer than a whitish color when a color to be displayed using the display device is the whitish color; and

a filter [disposed on the front side of the first to third fluorescent substances,] to receive the emitted color [other] warmer than the whitish color and [to approximate] adjusting [to the whitish color] the warmer color to [be displayed] the whitish color by attenuating light in an emission wavelength region of the discharge gas [using the display device].

2. (TWICE AMENDED) The gas discharge display device of claim 1, wherein

a structural [condition] dimension of a first display element corresponding to said first fluorescent substance is different from structural [conditions] dimensions of second and third display elements corresponding to said second and third fluorescent substances,

wherein the filter partially blocks the light emitted by the first element, and

a light-emission intensity of the first display element is higher than [a light-emission intensity of the first display element having a required intensity] would be necessary to reproduce the whitish color to be displayed by using [the] a combined light emission of the first to third display elements [without] that is not received by said filter.

3. (TWICE AMENDED) The gas discharge display device of claim 2, wherein

each of the display elements comprises a pair of electrodes to generate an electric discharge between the electrodes to allow the fluorescent substances to emit light, and

the [structural] dimension condition is [an] a surface area of the electrodes.

4. (TWICE AMENDED) The gas discharge display device of claim 3, wherein the surface area of the electrodes in the first display element is larger than [an] a surface area [of the electrodes in the first display element having an area that is required] that would be

necessary to reproduce the whitish color intended for display by using the combined light emission of the first through third display elements [without] that is not received by said filter.

5. (TWICE AMENDED) The gas discharge display device of claim 2, wherein

each of the display elements comprises a pair of electrodes to generate electric discharge between the electrodes to allow the fluorescent substances to emit light, and

the [structural] dimension condition of each display element is an area of a light-emission region of the fluorescent substance.

6. (TWICE AMENDED) The gas discharge display device of claim 5, wherein the area of the light-emission region of the fluorescent substance comprises a fluorescent substance layer in the first display element that has an area that is larger than [an area of the light-emission region of the fluorescent substance layer in the first display element having an area that is required] what would be necessary to reproduce the whitish color intended for display by using [the] a combined light emission of the display elements [without] that is not received by said filter.

7. (TWICE AMENDED) The gas discharge display device of claim 2, wherein

each of said display elements comprises

a pair of electrodes to generate an electric discharge between the electrodes to allow the fluorescent substances to emit light, and

dielectric substance layers that cover the respective electrodes, and

the structural [condition] dimension is a thickness of the respective dielectric layers.

8. (TWICE AMENDED) The gas discharge display device of claim 7, wherein the thickness of the dielectric substance layers in said first display element is less than [a thickness of the dielectric substance layers in the first display element having a thickness that is required] what would be necessary to reproduce the whitish color intended for display by using [the] a combined light emission of the display elements [without] that is not received by said filter.

9. (TWICE AMENDED) The gas discharge display device of claim 1, wherein a light-emission intensity of a first display element corresponding to said first fluorescent substance is higher than [a light-emission intensity of the first display element having] an intensity that [is required] would be necessary to reproduce the whitish color intended for display by using [the] a

combined light-emission of first through third display elements corresponding to said first to third fluorescent substances [without] that is not received by said filter.

28. (ONCE AMENDED) A gas discharge display device using a plasma ~~display panel,~~ comprising: [having]

a plurality of discharge cells formed within a discharge space between a front substrate and a rear substrate, each of the discharge cells including a discharge gas therein and being provided with one of fluorescent substances of [red, green and blue, the] first, second, and third fluorescent substances [being] selected to emit light for performing color display; and [, said device comprising:]

a filter having a characteristic of absorbing light within a wave range of visible light emitted by the discharge gas, the filter being disposed on a front side of the front substrate [of the plasma display panel], wherein [, in the plasma display panel,] a light-emission intensity of at least one of the fluorescent substances [of red, green and blue] is set to be larger than [the light-emission intensity of at least one of the said fluorescent substances at displaying] would be necessary to display an intended white light by simultaneous unfiltered light emission of the fluorescent substances, so that light within the wave range is emitted with intensity to compensate for attenuation of light within the wave range absorbed by the filter.

29. (NEW) A display apparatus for displaying a target color, comprising:

a pixel comprising a first, second, and third cell, each cell comprising a discharge gas and a substance, where the discharge gas emits a discharge light that enters the substance of the cell causing the substance to emit an emission light, whereby each cell emits a color that is a combination of the discharge light and the emission light of the cell, and wherein the color of each cell is different from that of the other cells; and

a filter attenuating the discharge gas light of the first, second and third cells more than it attenuates the emission light of the first cell.

30. (NEW) The apparatus of claim 29, wherein the color emitted by the first cell is constructed to have an intensity greater than necessary to reproduce, in combination with the color emitted by the second and third cells, the target light.

31. (NEW) A display apparatus, comprising:

a discharge gas emitting a discharge light that includes a first red light;

a cell of a pixel having a substance that, in response to being irradiated by the discharge light, emits a second red light; and

a filter attenuating the first red light more than it attenuates the second red light.

32. (NEW) The apparatus of claim 31, wherein the intensity of the second red light is increased in proportion to its attenuation by the filter.

33. (NEW) The apparatus of claim 32, wherein the intensity of the second red light is increased by modifying a physical dimension of the cell, which includes a physical dimension of the substance of the cell.

34. (NEW) A gas discharge display device comprising:

a plurality of discharge cells formed within a discharge space between a front substrate and a rear substrate, the discharge cells including a discharge gas therein and being provided with first, second, and third fluorescent substances of red, green and blue, the fluorescent substances being selected to emit light for performing color display; and

a filter having a characteristic of absorbing light within a wave range of visible light emitted by the discharge gas, the filter being disposed on a front side of the front substrate, wherein a light-emission intensity of at least one of the fluorescent substances is set to be larger than would be necessary to display an intended white light by simultaneous light emission of the fluorescent substances, so that light within the wave range is emitted with intensity to compensate for attenuation of light within the wave range absorbed by the filter.

35. (NEW) The gas discharge display device of claim 34, wherein

a structural dimension of a first display element corresponding to said first fluorescent substance is different from structural dimensions of second and third display elements corresponding to said second and third fluorescent substances,

wherein the filter partially blocks the light emitted by the first element, and

a light-emission intensity of the first display element is higher than would be necessary to reproduce the whitish color to be displayed by using a combined light emission of the first to third display elements that is not received by said filter.

36. (NEW) The gas discharge display device of claim 35, wherein

each of the display elements comprises a pair of electrodes to generate an electric discharge between the electrodes to allow the fluorescent substances to emit light, and

the dimension condition is a surface area of the electrodes.

37. (NEW) The gas discharge display device of claim 36, wherein the surface area of the electrodes in the first display element is larger than a surface area that would be necessary to reproduce the whitish color intended for display by using the combined light emission of the first through third display elements that is not received by said filter.

38. (NEW) The gas discharge display device of claim 35, wherein

each of the display elements comprises a pair of electrodes to generate electric discharge between the electrodes to allow the fluorescent substances to emit light, and

the dimension condition of each display element is an area of a light-emission region of the fluorescent substance.

39. (NEW) The gas discharge display device of claim 38, wherein the area of the light-emission region of the fluorescent substance comprises a fluorescent substance layer in the first display element that has an area that is larger than what would be necessary to reproduce the whitish color intended for display by using a combined light emission of the display elements that is not received by said filter.

40. (NEW) The gas discharge display device of claim 35, wherein

each of said display elements comprises

a pair of electrodes to generate an electric discharge between the electrodes to allow the fluorescent substances to emit light, and

dielectric substance layers that cover the respective electrodes, and

the structural dimension is a thickness of the respective dielectric layers.

41. (NEW) The gas discharge display device of claim 40, wherein the thickness of the dielectric substance layers in said first display element is less than what would be necessary to reproduce the whitish color intended for display by using a combined light emission of the display elements that is not received by said filter.

42. (NEW) The gas discharge display device of claim 34, wherein a light-emission intensity of a first display element corresponding to said first fluorescent substance is higher than an intensity that would be necessary to reproduce the whitish color intended for display by using a combined light-emission of first through third display elements corresponding to said first to third fluorescent substances that is not received by said filter.

43. (NEW) The gas discharge display device of claim 34, wherein said filter has a color correction function for increasing a color temperature value.

44. (NEW) The gas discharge display device of claim 34, wherein said filter attenuates an intensity of light in a red wavelength region.

45. (NEW) The gas discharge display device of claim 34, wherein said filter has a characteristic such that an average transmissivity of light in a green wavelength region is lower than an average transmissivity of light in a blue wavelength region, and higher than an average transmissivity of light in a red wavelength region.

46. (NEW) The gas discharge display device of claim 34, wherein within a red wavelength region, said filter has a characteristic such that a transmissivity of a longer wavelength is higher than a transmissivity of a shorter wavelength.

47. (NEW) The gas discharge display device of claim 34, wherein said filter has a characteristic such that a wavelength providing the lowest transmissivity has a value within a range of 560 to 610 nanometers.

48. (NEW) The gas discharge display device of claim 34, wherein said filter has a characteristic such that absorption peaks appear at least in a wavelength region of 470 to 520 nanometers and in a wavelength region of 560 to 610 nanometers.

49. (NEW) The gas discharge display device of claim 34, further comprising a pair of substrates for forming a discharge space therebetween, and wherein said filter is formed directly on an inner or outer surface of one of said substrates that constitutes a display surface.

50. (NEW) The gas discharge display device of claim 34, further comprising a display panel having a discharge space therein with arranged display elements, and wherein said filter is fabricated separately from said display panel and disposed on a front side of said display panel.

51. (NEW) The gas discharge display device of claim 34, further comprising a display panel having a discharge space therein with arranged display elements and a transparent protection plate for protecting a display surface of said display panel, and wherein said filter is disposed on an inner or outer surface of the protection plate.

52. (NEW) The gas discharge display device of claim 34, wherein said filter is a pigment filter.

53. (NEW) The gas discharge display device of claim 34, wherein said filter is a multi-layer film filter.

54. (NEW) The gas discharge display device of claim 34, wherein said first fluorescent substance is a fluorescent substance for red composed essentially of (Y, Gd) B03 : Eu, said second fluorescent substance is a fluorescent substance for green composed essentially of Zn2Si04 : Mn, and said third fluorescent substance is a fluorescent substance for blue composed essentially of BaMgA110017 : Eu.

55. (NEW) The gas discharge display device of claim 34, further comprising a discharge space filled with a Penning gas composed essentially of neon and xenon as a discharge gas.